OpenStax Ch. 31 - Radioactivity & Nuclear Physics **Name**

This shows **some** of the possible questions you encountered on the online test. Point values here are arbitrary.

1. (4) How many protons, neutrons, and nucleons in a nucleus of ^{222}Rn, and what is the name of the element?

2. (5) ^{14}N is a stable isotope of nitrogen while ^{13}N is unstable. How does ^{13}N differ from the more common ^{14}N?

a. They have different numbers of protons.
b. They have different numbers of electrons.
c. They have different numbers of neutrons.
d. Nitrogen-13 is radioactive, while nitrogen-14 is not.
e. Both c & d are true.

3. (5) ^{32}P decays by β^- emission and has a half-life of 14.28 days. If you start with a 50.0 μg sample, what mass of ^{32}P is left 32.0 days later, in μg?

4. (5) The radio- activity from a sample is 2.00 decays/second, and it is known that its half-life is 1.25×10^9 years. How many radioactive nuclei are present in the sample, in units of peta-nuclei (P=10^{15} nuclei)?

5. (5) A neutral atom of lithium-6 has a mass of 6.015122 u. Calculate the total binding energy in MeV. Some atomic masses you may need: m(^{1}H) = 1.007825u, neutron mass = 1.008665u.

6. (5) Only 0.0117% of naturally occurring potassium is radioactive ^{40}K, which decays with a half-life of 1.277×10^9 years. Suppose a banana contains 254 milligrams of potassium (all isotopes, whose average mass is 39.0983 u). Estimate the banana's activity due to ^{40}K, in becquerels (decays/second).

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7. (5) In carbon of living organisms, the activity due to radioactive carbon-14 is 0.25 Bq/gram, (1 Bq = 1 decay/s), and the half-life of C-14 is 5730 years. If a 1.00-gram sample of carbon from an archeological site is producing an activity of 36×10^{-3} Bq, how much time has passed since the organism that produced it died, in years?